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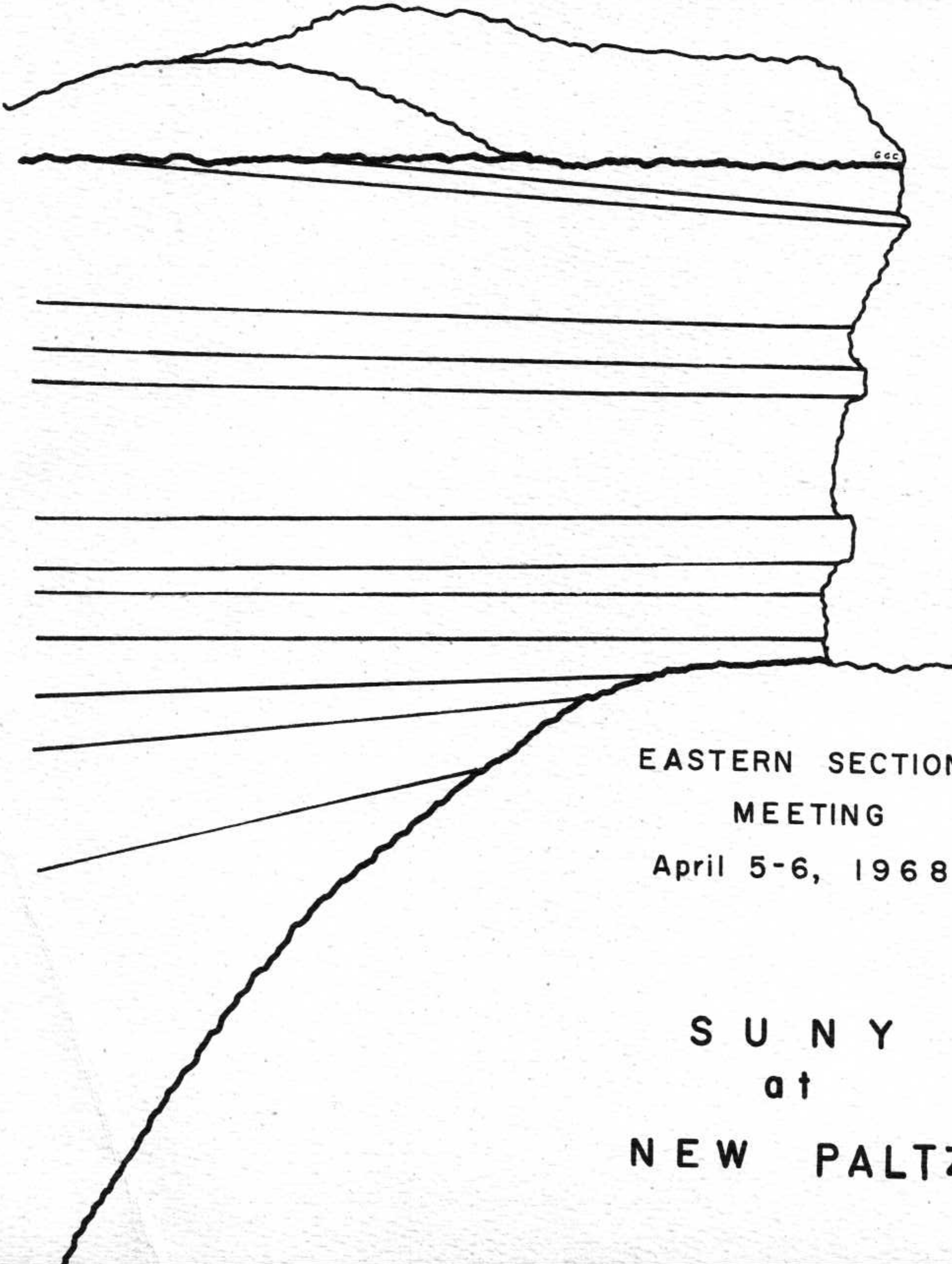

EASTERN SECTION

MEETING

April 5-6, 1968

SUNY

at

NEW PALTZ

N A T I O N A L A S S O C I A T I O N

O F

G E O L O G Y T E A C H E R S

GUIDEBOOK TO FIELD TRIPS

Eastern Section Meeting
April 5-6, 1968

Hosted by

THE GEOLOGY STAFF

State University of New York
College at New Paltz

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THE SILURIAN - ORDOVICIAN ANGULAR UNCONFORMITY, SOUTHEASTERN NEW YORK

The Silurian - Ordovician Angular Unconformity, Southeastern New York

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An angular unconformity related to Late Ordovician Taconian orogenic movements has long been recognized from Pennsylvania to Quebec. Considered here are the results of investigations of exposures of this unconformity at fourteen locations from the vicinity of Port Jervis northeast to Kingston, New York (Figure 1).

In general, Silurian strata onlap disturbed Ordovician beds in an apparent northeast direction. Throughout much of the area (Figure 1), northeast along the eastern front of the Shawangunk Mountains to locations 8 and 9 (just north of Rosendale), a decreasingly thick Shawangunk Conglomerate (Middle to Late Silurian) overlies shales and siltstones of Martinsburg aspect (late Middle to early Late Ordovician). The High Falls Shale, which overlies the Shawangunk Conglomerate, has yet to be seen in contact with Ordovician strata. However, onlap contacts of the succeeding Binnewater Sandstone (Late Silurian) do occur with greywackes and shales of Austin Glen aspect (late Middle Ordovician) just south of Kingston (locations 5, 6 and 7).

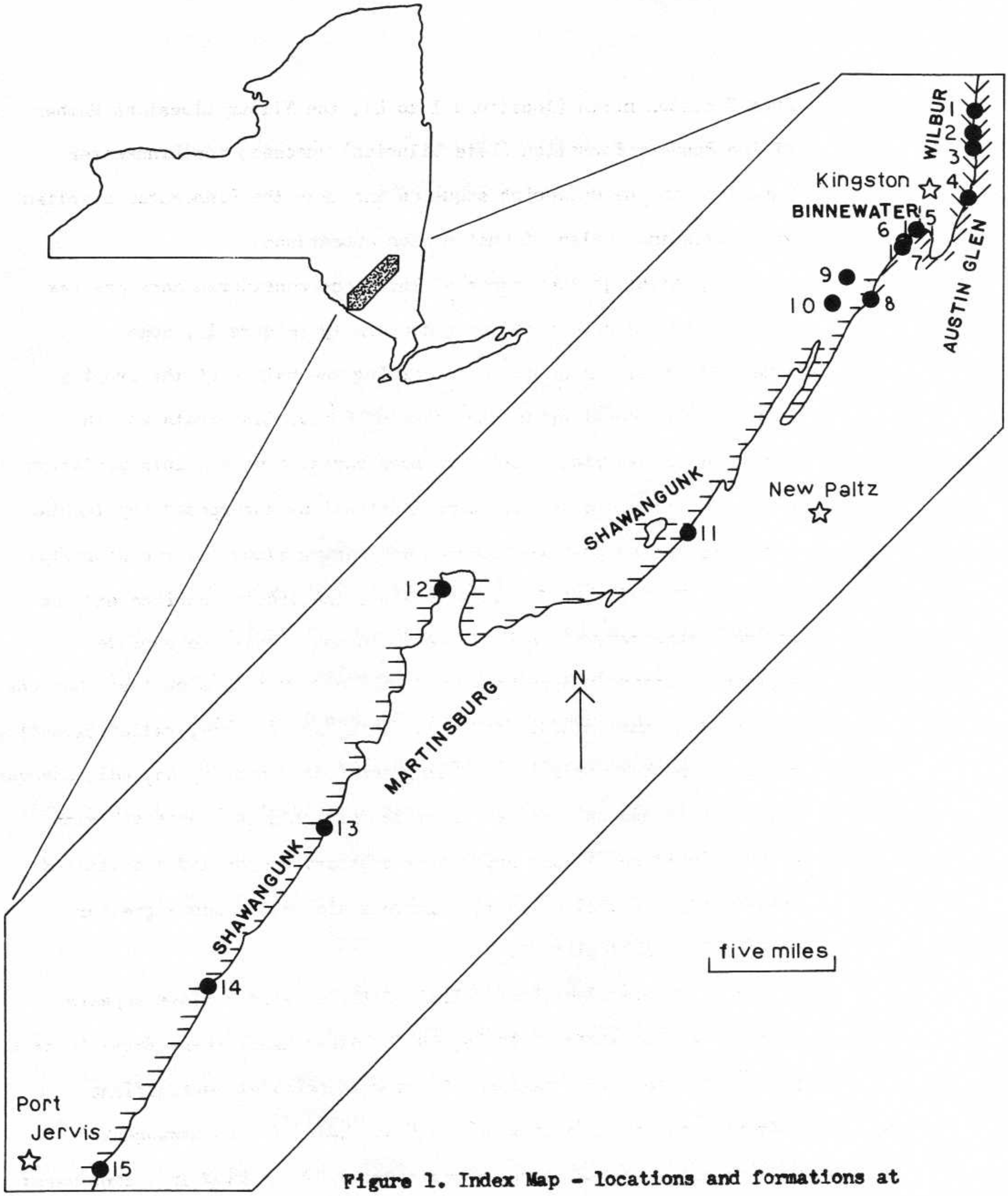

Figure 1. Index Map - locations and formations at the Silurian - Ordovician angular unconformity.

From Kingston north (locations 1 to 4), the Wilbur Limestone Member of the Rondout Formation (Late Silurian) succeeds the Binnewater Sandstone in the onlapping sequence and like the Binnewater overlies greywackes and shales of Austin Glen appearance.

Although the number of locations considered here are few compared to the extent of the unconformity (Figure 1), some generalizations can be drawn concerning the nature of the erosion surface, the pre-Silurian structure of Ordovician strata and the direction of Silurian onlap. In some cases, however, interpretation of these characters is made more difficult by superposed Appalachian tectonics and by post-Appalachian weathering along the unconformity.

Relief: At few locations was the erosion surface exposed for more than several tens of feet. In most cases the surface appeared relatively even with micro-relief commonly much less than one inch in the same lateral distance. On a larger scale, relief exceeding one foot in three is rare. At Kingston (locations 4a, 4c, 4d), however, relief up to two and one-half feet is three has been observed with Wilbur Limestone filling apparently creviced and/or ledge-weathered greywackes. In all, relatively large scale relief seems greater northeast from location 7.

At most locations relief of the erosion surface appears random. At locations 12 to 15, on the other hand, there seems to be a runnel- or scour-like pattern of somewhat parallel corrugations reflected on the underside of the basal beds of the Shawangunk Conglomerate. These corrugations trend N55°E to N30°E and, considered together with crossbedding evidence near the contact at location 13 (N30°-40°E), seem to indicate an advance of Silurian seas to the northeast.

Weathering: The nature of materials just beneath the unconformity seems to vary according to regional position. In the southwest (locations 12 to 15), apparently residual, fragmented shales seem to overlie unweathered, well-bedded shales. The fragmented shales may exceed twenty-one inches in thickness (location 12), but in general are much thinner (one to six inches). Included within these shales are various amounts of limonitic material and scattered rounded quartz pebbles of Shawangunk aspect.

Centrally, from location 11 to 8, a generally thin (four inches or less), somewhat limonitic clayey material overlies two feet or less of discolored (weathered?) shales and siltstones. Occasional rounded quartz pebbles occur in the clayey substance. The discolored shales may be shot through by fine limonite-bearing fractures which, at location 9a, contain sand grains and occasional quartz pebbles. A lateritic origin is very tentatively suggested for the clays of the central region.

To the northeast, where the Binnewater Sandstone overlies greywackes and shales of Austin Glen aspect, there appears to be little, if any, chemical weathering at the unconformity. Rather, Binnewater sand grains seem to have been introduced along Austin Glen bedding and joint planes – probably due to wave action.

From the region of Kingston north, there appears to be little chemical weathering of the Austin Glen. Occasional thin occurrences of soft-weathering debris at the unconformity are presently indeterminant in origin and may be caused, at least in part, by faulting and/or post-Appalachian weathering along the contact.

<u>Pre-Silurian Structure</u>: Present knowledge of structural detail in the vicinity of exposures of the unconformity is meagre. Consequently it has been necessary to assume lack of rotation of those Appalachian fault blocks which incorporate the erosion surface even though this assumption may be especially tenuous in the vicinity of the Kingston Arc (locations 8 to 4).

As may be seen in Table 1 and Figure 2, the pre-Silurian trend of Ordovician strata appears to lie in a general north-south direction as compared to the present northeasterly trend of Silurian strata. It would seem, therefore, that in this region the directions of application of Taconian and Appalachian orogenic forces differ. In addition, inspection of Table 1 indicates that Ordovician strata to the southwest (locations 15 to 8) were more gently tilted with dips not exceeding 30°. To the northeast, on the other hand, Ordovician strata were tilted variously from 30° to 85°. This agrees with the general idea that Taconian deformation increased to the east.

Information regarding pre-Silurian joint, fracture, fault and fold patterns is too limited to allow any general conclusions at present. For this reason it is necessary to search for additional exposures of the unconformity and to examine more intensively those already located.

<u>Summary</u>: In general, for the area under consideration, study of the Late Ordovician - Early through Middle Silurian erosion surface has revealed the following:

1. Taconian deformation of late Middle and earlier Ordovician marine sediments increases eastward.

2. Taconian orogenic forces were applied in a general east-west direction.

3. Middle through Late Silurian seas onlapped a peneplained land surface in a general northeasterly direction, successively depositing:

   (a) quartz pebble conglomerate on a thin fragmented shale pavement

   (b) quartz pebble conglomerate on a thin (lateritic?) clayey residue of weathered shale

   (c) sandstone then limestone on a relatively "fresh", slightly irregular surface eroded in greywacke.

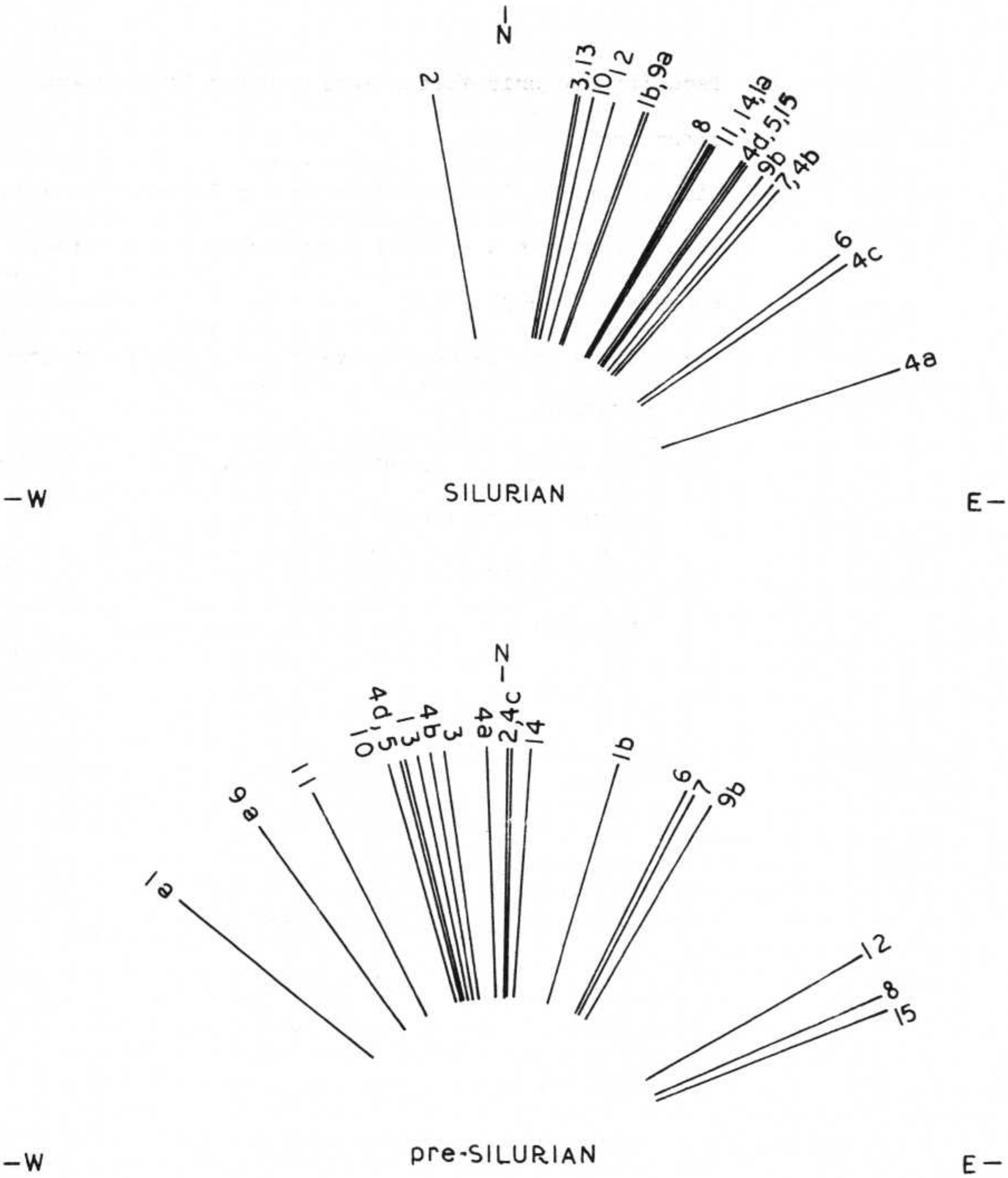

Figure 2. Comparison of trends of Silurian strata and pre-Silurian trends (estimated) of Ordovician strata.

TABLE 1

Location	Stratigraphic Relations at Unconformity*	Silurian Strike & Dip	Ordovician Strike & Dip	Estimated pre-Silurian Ordovician Strike & Dip**
1a	W/AG	N30E - 10SE	N40W - 40NE	N52W - 38NE
1b	W/AG	N20E - 5NW	N15E - 40SE	N16E - 45SE
2	W/AG	N10W - 45SW	N - 72E	N 1E - 63W
3	W/AG	N10E - 30SW	N10W - 65NE	N 8W - 86SW
4a	W/AG	N71E - 10NW	N 5W - 70NE	N 2W - 73E
4b	W/AG	N41E - 75NW	N44W - 50NE	N10W - 85NE
4c	W/AG	N55E - 30NW	N10W - 60NE	N 1E - 76E
4d	W/AG	N35E - 45NW	N17W - 70NE	N14W - 80SW
5	B/AG	N35E - 50NW	N75E - 36NW	N14W - 30NE
6	B/AG	N53E - 40NW	N23W - 20NE	N26E - 49SE
7	B/AG	N40E - 55NW	N40W - 11NE	N27E - 58SE
8	S/AG-M	N29E - 83NW	N40E - 82SE	N66E - 19NW
9a	S/M	N20E - 65SE	N48E - 53SE	N36W - 26SW
9b	S/M	N38E - 65SW	N45E - 35NW	N30E - 30SE
10	S/M	N12E - 52SE	N25E - 38SE	N16W - 17SW
11	S/M	N30E - 45NW	N20E - 50NW	N27W - 9SW
12	S/M	N15E - 13NW	N25E - 17NW	N60E - 4NW
13	S/M	N10W - 30SW	N 7W - 15SW	N12W - 15NE
14	S/M	N30E - 30NW	N20E - 45NW	N 4E - 16W
15	S/M	N35E - 18NW	N20E - 15NW	N68E - 6SE

*Silurian
W - Wilbur Limestone
B - Binnewater Sandstone
S - Shawangunk Conglomerate
Ordovician
M - shales and siltstones of Martinsburg aspect
AG - greywackes and shales of Austin Glen aspect

**Determined by polar solution on "Wulff" stereographic net (Phillips, 1955, p. 30, text-fig. 41).

TABLE 2

Location Coordinates and Map References

Location	Lat. N	Long. W	7½' Quadrangle
1a	41°58'25"	73°58'18"	Kingston East
1b	41°58'25"	73°58'18"	Kingston East
2	41°57'55"	73°58'19"	Kingston East
3	41°57'23"	73°58'12"	Kingston East
4a*	41°55'30"	73°58'34"	Kingston East
4b*	41°55'25"	73°58'38"	Kingston East
4c*	41°55'15"	73°58'51"	Kingston East
4d	41°55'15"	73°58'53"	Kingston East
5	41°54'16"	74°00'43"	Kingston West
6	41°54'01"	74°01'08"	Kingston West
7	41°53'55"	74°01'22"	Kingston West
8	41°52'06"	74°03'18"	Rosendale
9a	41°52'35"	74°04'10"	Kingston West
9b	41°52'35"	74°04'08"	Kingston West
10	41°51'53"	74°04'49"	Rosendale
11	41°44'04"	74°11'41"	Gardiner
12	41°41'44"	74°23'09"	Ellenville
13	41°33'50"	74°27'45"	Wurtsboro
14	41°28'31"	74°33'06"	Otisville
15	41°22'26"	74°37'41"	Port Jervis South

* Van Ingen and Clark, 1903, pl. 2.

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MAP REFERENCES

Topographic: U. S. Geol. Surv., 7½ Minute Series: Scale 1:24,000

Name	Edition	Contour Interval
Ellenville, N. Y.	1942	20'
Gardiner, N. Y.	1957	20'
Kingston East, N. Y.	1963	10'
Kingston West, N. Y.	1964	20'
Otisville, N. Y.	1942	20'
Port Jervis South, N.J.-N.Y.	1943	20'
Rosendale, N. Y.	1964	20'
Wurtsboro, N. Y.	1943	20'

Geological: Geologic Map of New York, Lower Hudson Sheet: N. Y. State Mus. and Sci. Serv., Geol. Surv., Map and Chart Ser., no. 5; scale 1:250,000; contour interval 100 feet.

ROAD LOG FIELD TRIP

Co-leaders: R. H. Waines and Barbara Sanders

Total Miles	Miles Between Points	Remarks
0.0	0.0	College Motor Inn parking lot. Exit, turning right onto NY 299. Proceed west over NYS Thruway.
0.8	0.8	Traffic light. Continue through New Paltz on NY 299.
1.4	0.6	New York Central Railroad track.
1.5	0.1	Bridge over Wallkill River. Continue west on NY 299.
7.1	5.6	Stop. Turn right. Proceed north then west on US 55 - NY 44 up the eastern slope of the Shawangunk Mountain cuesta.
7.9	0.8	Hairpin turn. Exposures of Martinsburg-type shales (Ordovician).
8.4	0.5	Turn left into parking area on far side of road. Watch for oncoming traffic. A clear day affords a view of the Hudson Highlands to the southeast and the Wallkill River valley and Marlboro Hills to the east. Almost two hundred feed of cliff-forming quartz conglomerate and orthoquartzites cap the mountains at this point. The cliffs to the north are frequently used for practice in mountain climbing.

Leave transportation and walk about thirty yards toward the mountain along south side of highway (facing traffic). Stop 1 lies about 200 yards south of the highway at the base of the cliff. As there is no distinct

path, care should be taken in progressing over the intervening large angular boulders (especially if wet).

STOP 1 (location 11): Here several hundred feet of quartz conglomerate and orthoquartzite of the Shawangunk Formation overlie shales and siltstones of Martinsburg aspect in angular unconformity (see Table 1).

Excavation of the contact at this point has revealed: the uppermost foot of shales becomes progressively softer and more clay-like toward the contact; the initial dark grey color grades upward into light olive-green and mustard. Within this transition zone thin layers of dark red to orange, soft clayey material occur along bedding and joint or fracture planes. Fractured angular quartz pebbles and occasional platey quartz fragments and rounded quartz pebbles appear most numerous in the uppermost half-inch of clayey material but also have been found as deep as four inches below the contact. Two thin limonitic zones of hard-pan-like material have been found about one-quarter to one inch and four inches below the contact.

The upper foot of the shales is tentatively interpreted as representing chemically weathered, possibly lateritized shale material into which quartz pebbles of Shawangunk aspect and vein quartz fragments of Martinsburg aspect have been worked by mechanical means.

Return to transportation and proceed back toward New Paltz on US 55 - NY 44.

Turn left onto NY 299 and continue toward New Paltz.

15.3	5.6	Bridge over Wallkill River.
15.4	0.1	New York Central Railroad track.
15.5	0.1	Turn left and proceed north on NY 32. Scattered exposures on either side of highway for next five miles are formed of shales and siltstones of Martinsburg aspect.
20.3	4.8	Bridge over Wallkill River.
21.5	1.2	Tillson.
22.7	1.2	Bridge over Rondout Creek at Rosendale.
24.5	1.8	Bridge over NYS Thruway.
24.6	0.1	Turn right onto Alberts Avenue (unpaved). Proceed about 0.1 miles and park beyond garages on right. Walk north about 0.1 miles to quarry in shales and siltstones.

STOP 2 (location 8): The following sequence ascends (east to west) from the quarry to a mine pit just to the west:

(a) somewhat disturbed siltstones and shales of either Martinsburg or Austin Glen aspect occurring in the quarry

(b) Shawangunk Conglomerate in angular unconformity with underlying shales and steeply dipping to the northwest

(c) High Falls Shale, greenish to reddish, occasionally conglomeratic mudstones, largely covered but dipping steeply to the northwest.

(d) Binnewater Sandstone, light colored, cross-bedded orthoquartzite, largely covered and dipping to the northwest

(e) Rosendale Dolostone Member of Rondout Formation forming the mine pit.

At this location the Shawangunk Formation has been reduced to three feet of poorly sorted, argillaceous, pyritic to limonitic quartz conglomerate which lies with angular unconformity on shales of either Martinsburg or Austin Glen aspect (see Table 1). Up to one inch of relief in the same lateral distance has been observed at the contact. The shales to a depth of about 2.4 feet below the contact are olive- to grey-green and generally softer toward the top, contrasting somewhat with the more resistant dark grey shales below. Small limonitic nodules (weathered pyrite?) have been observed from one to two inches to as much as two feet below the unconformity.

Just below the contact, the shales contain somewhat irregular fine reddish "lines" which seemingly have two preferred orientations (N 45°E and N 85°E). Whether these directions reflect pre-Silurian jointing or foliation trends is still to be determined.

The shales beneath the unconformity are here thought to be only slightly weathered chemically compared to those at Stop 1 (loc. 11). There is no suggestion of a residual soil.

Return to transportation and NY 32.

24.8	0.2	Stop. Turn right and proceed north on NY 32.
26.2	1.4	Turn right (east) onto DeWitt Lake Road.
27.0	0.8	Turn left onto Mountain Road and proceed north.
27.7	0.7	Park on right just before junction with NY 213. Walk back (south) facing traffic along Mountain Road about 100 yards then cross over to examine outcrop on uphill side of road.

STOP 3 (location 7): Here the Shawangunk Conglomerate and overlying High Falls Shale are missing and greywackes and shales of Austin Glen appearance are unconformably overlain by a poorly sorted, argillaceous, quartz pebble-bearing, quartzose basal unit of the Binnewater Sandstone. The pebbles are quartz, rounded, and of Shawangunk aspect. The greywacke beneath the contact exhibits little, if any, chemical weathering but does show mechanical intrusion of sand size quartz particles (Binnewater) along bedding and joint planes with vertical penetrations of several inches and horizontal penetrations of much more. Limonitic (pyritic?) lenses have been found in zones parallel to bedding both above and below the contact.

Maximum relief at the contact at Location 6 (about 0.1 miles north of this stop) is about one foot in three horizontal feet. One joint set in the greywackes at the same location (6) has an attitude of N 15°W, 85°E compared to a joint set in the overlying Binnewater Sandstone of N 5°W, 70-75°E. It might be possible that the set in the greywacke (which is also intruded by sand) may be pre-Silurian in origin; this set may also have accommodated stresses which later caused a different joint set in the Binnewater Sandstone.

Return to transportation and continue north from Mountain Road onto Abeel Street after first coming to a full stop. NY 213 enters from the right.

27.8	0.1	Pass under Nytralite conveyor. Location 6 is just north of the conveyor on the left.
28.3	0.5	City of Kingston Wilbur Gravel Pit on left (also location 5).
28.8	0.5	Wilbur. Keep right on Abeel Street (leaving NY 213) and continue northeast.
29.2	0.3	Pass under New York Central Railroad bridge.
30.0	0.9	Traffic light. Turn left onto US 9W.
30.3	0.3	Traffic light. Turn right, continuing on US 9W.
30.7	0.4	Traffic light. Turn right onto East Chester Street (US 9W), crossing railroad tracks and proceed north.
31.9	1.2	Traffic light. Turn right and proceed north on NY 32.
33.8	1.9	Park well off highway and cross with caution to outcrops on west side of road.

STOP 4 (location 2): From Kingston (location 4) to this stop and for some distance north the Binnewater Sandstone is absent and greywackes and shales of Austin Glen aspect are overlain with angular unconformity by the fossiliferous Wilbur Limestone Member of the Rondout Formation. At this location differences in thickness between the contact and fossiliferous and limonitic marker beds within the Wilbur Limestone suggest a maximum relief of about two feet between contacts exposed on either side of a road cut bisecting the outcrop. On a smaller scale a relief of two inches in six has been observed. There appears to be little evidence of chemical weathering at this location and, although the lower part of the Wilbur Limestone is often somewhat arenaceous, there also appears to be little evidence for

mechanical intrusion of the greywackes by sand grains.

Return to transportation and continue north along NY 32.

34.3	0.5	Location 1 on left.
34.6	0.3	NY 199 overpass.
34.7	0.1	Turn right, then circle right to NY 199.
34.8	0.1	Enter NY 199 heading west.
34.9	0.1	Pass over NY 32.
35.8	0.9	Pass over US 9W and enter US 209 continuing west.
36.6	0.8	Bridge over Esopus Creek.
37.0	0.4	Pass over NYS Thruway. Continue west then south on US 209.
39.4	2.4	Pass under NY 28.
39.5	0.1	Bear right into NY 28 turnoff.
39.6	0.1	Enter NY 28 heading east.
40.0	0.4	Traffic signal.
40.2	0.2	Enter traffic circle. Bear right and continue about three-quarters around circle to enter NYS Thruway turnoff.
40.5	0.3	Toll booth NYS Interchange 19. Follow signs to New York and proceed south on Thruway to NYS Interchange 18 (New Paltz). Return distance from toll booth to College Motor Inn is 17 miles.

F I E L D   T R I P   B

THE ROSENDALE READVANCE

IN THE

LOWER WALKILL VALLEY, NEW YORK

The Rosendale Readvance

in

The Lower Wallkill Valley, New York

G. Gordon Connally
Lafayette College
Easton, Pennsylvania

The general geomorphology, bedrock, and the development of the drainage net for the entire Wallkill Valley have been described by Connally and Sirkin (1967) in the guidebook for the 39th annual meeting of the New York State Geological Association. The valley is a northeast-southwest trending basin about 65 miles long and 20 miles wide. The lower valley is defined here as that part from the village of Wallkill, New York to the confluence of the Wallkill River and Rondout Creek near Rosendale, New York. The lower valley is bounded by the Shawangunk escarpment on the west and the Marlboro mountain hogback on the east. From Rosendale northeastward, Silurian and Devonian limestones form the western uplands. The valley is underlain by rocks of the Ordovician Martinsburg Group.

The entire valley lies within the Hudson-Mohawk province of New York State (Broughton, et al., 1962). The topography is dominated by northeast-trending hogbacks, roches moutonnées and scattered drumlins. In the valley bottom, proglacial lake sediments form a flat featureless plain.

The head of the lower valley is a bedrock knickpoint near the village of Wallkill (Howard, 1967). From this knickpoint northward the Wallkill River flows over a dissected lake plain at about 200 feet in elevation however, there is a deep bedrock gorge beneath the valley (Berkey, 1911 and Connally and Sirkin, 1967, Fig. 2B) that reaches almost 100 feet below sea level. Thus, the lower Wallkill River is occupying the valley of a much more vigorous ancestor that had a much steeper gradient.

GLACIAL RECESSION

As the glacier terminus receded northward up the Wallkill Valley the higher land to the south served as a natural barrier to drainage and proglacial lakes were impounded south of the melting ice.

When the terminus melted back to the Wallkill knickpoint a stillstand began and resulted in a complex of at least three ice marginal positions called collectively the Wallkill Moraine. The moraine is named for the massive constructional topography east of the village of Wallkill however, it is traceable for almost 20 miles northeastward. North of New Paltz the moraine loses its sharp definition and blends into an esker complex.

The Wallkill Moraine dammed a lake that drained southward at an elevation of about 400 feet. However, when the ice front receded north of the knickpoint a new lake was formed between the knickpoint and the ice margin.

GLACIAL LAKE TILLSON

When the glacier retreated from the north end of the Marlboro Mountain hogback, the new lake evidently drained through, under, or around the ice margin, into the Hudson Valley. Thus, a lake level of about 230 feet was maintained. The limits of this lake, here named Glacial Lake Tillson, are shown in Figure 1.

The limits of Lake Tillson can be interpreted from many small sandy deltas (Stop #2), from the (wave washed?) shoulders of bare bedrock at its edge, and from scattered exposures of varved lacustrine clays. The comparatively rapid rise in elevation of the sand plain near Tillson suggests that the dam for Lake Tillson stood immediately north of this point.

THE ROSENDALE READVANCE

At present there appears to be a difference of at least 30 feet in the elevations of Lake Tillson in the lower Wallkill Valley and Lake Albany in the Hudson Valley. The Lake Tillson water plain stands at 230 feet while that of Lake Albany appears to be at 200 feet. Thus, an ice dam must have been present in the lower Wallkill to account for the elevation difference.

The first line of evidence suggesting an ice margin north of Tillson is the rise in elevation of a sandy, deltaic plain

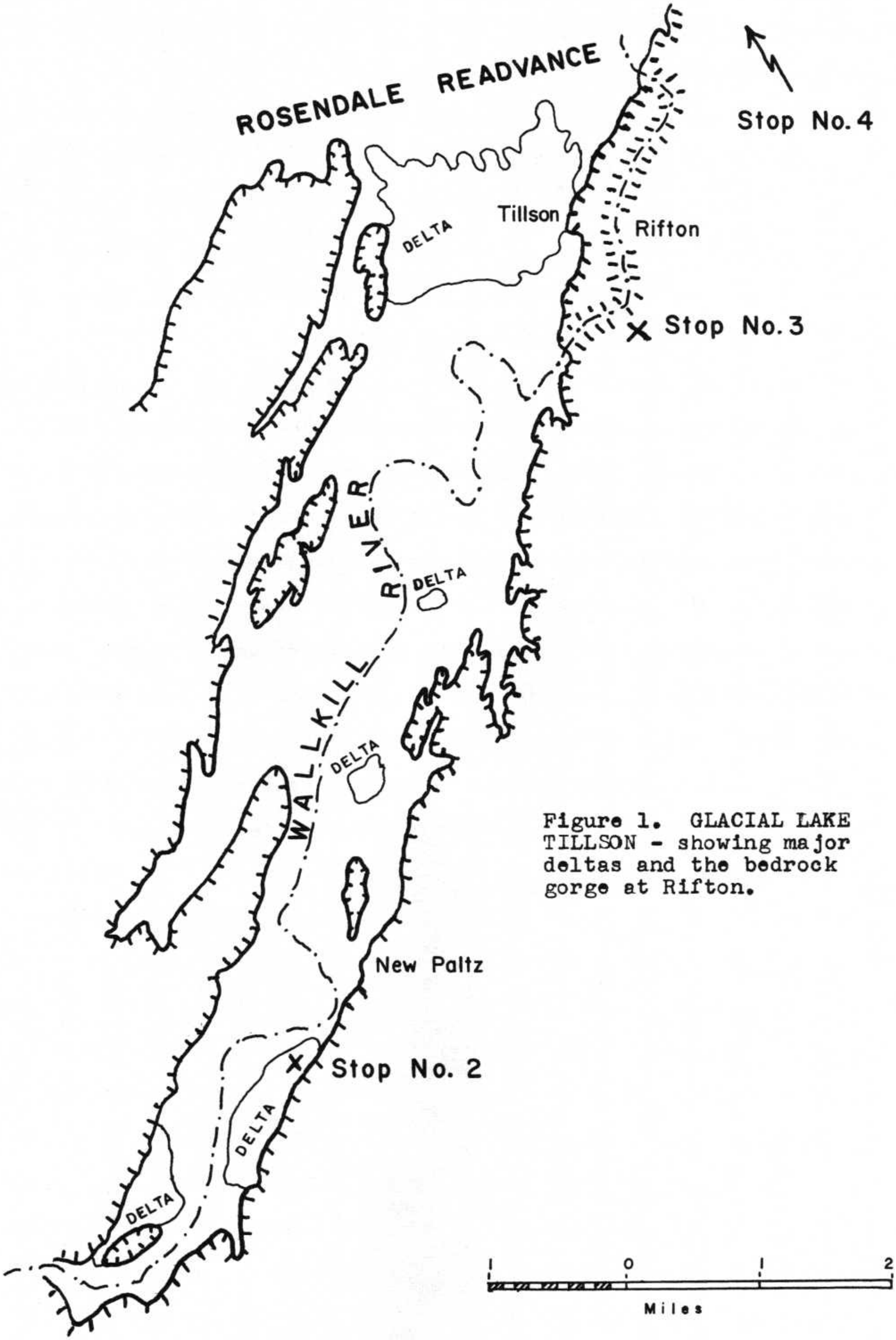

Figure 1. GLACIAL LAKE TILLSON - showing major deltas and the bedrock gorge at Rifton.

in the vicinity of Tillson. This rise probably represents the foreset slope of a delta that crests at about 250 feet. Both large and small scale features indicate deltaic deposition from the north or northwest. A northern source would imply a glacial source for the sediment while a northwestern source would indicate sediment deposited by Rondout Creek because the ice dam prevented northerly drainage.

A second line of evidence suggesting an ice margin to the north is the diversion of the Wallkill River into a bedrock gorge near Rifton (Stop #3). Instead of reoccupying the ancestral channel, filled with almost 300 feet of lacustrine sediment, the Wallkill was forced eastward into a new channel. The sediment that blocks the ancestral course is deltaic sand that would be much more erodible than the Martinsburg sandstones and shales. This suggests that the glacial terminus diverted the drainage around the ice margin and that the gorge dates from this event.

The first line of evidence that the ice marginal position at Rosendale represents a readvance, rather than a stillstand, is seen in the deltas deposited where streams entered Lake Tillson. These deltas exhibit only coarse grained sands with festooned, cut-and-fill, cross-stratification typical of topset beds. The Plains Road delta (Stop #2) shows more than 20 feet of such topset beds. The best explanation for the presence of thick topset and no foreset or bottomset beds probably is a steadily rising water level during deposition.

This suggests that the lower valley was partially, or completely drained following glacial recession and that a readvance to the Rosendale vicinity was responsible for Lake Tillson.

The second line of evidence is an apparent till deposit overlying lacustrine sand at the Maple Hill sand pit west of Creeklocks (Stop #4). In this pit 30 or more feet of laminated silts and fine sands are overlain by 10 to 25 feet of coarse grained foreset sands that are in turn overlain by 5 to 12 feet of contorted, slumped, sandy, clay containing boulders up to five feet in length. This upper deposit is interpreted as either a thin lodgement till or a flow till derived from an ice margin immediately north of the locality. Both large and small scale structures indicate that the sands were deposited from the north.

Thus, it appears that the deposits north of Rosendale represent the readvance of a glacial margin, over its own outwash and that the outwash was deposited in the rising waters of Lake Tillson. South of Rosendale, the diversion of the preglacial Wallkill River further attests to the presence of the ice margin in this vicinity. The name Rosendale Readvance is proposed here as the formal name for these events.

AGE

Connally and Sirkin (1967) and Sirkin and Connally (in preparation) have shown that sedimentation contemporaneous with the establishment of the Wallkill Moraine (and the 400 foot level proglacial lake to the south) probably commenced about 15,000

years before present. Thus, the Rosendale Readvance must be younger than this date.

Late in the 1967 field season the writer, accompanied by Dr. James F. Davis of the New York Geological Survey and Dr. Sirkin, removed an eight meter core from a bog near Lake Luzerne in the southeastern Adirondacks. Peat from the base of this section yielded a radiocarbon date of 12,400 ± 200 years before present (I-3199). This date will be discussed in another publication however, it is thought to closely postdate the last (Luzerne) readvance into the northern Hudson Valley.

These two dates serve to bracket the Rosendale Readvance as occurring sometime between 15,000 and 12,400 years ago. It is interesting to note that both the date and the latitude are similar to those for the Middletown Readvance in the Connecticut Valley.

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Road Log for Trip B

G. Bordon Connally

TOTAL MILES	Miles from last stop	Remarks
00.0	00.0	Assembly Point: The parking lot behind the Coykendall Science Building at the State University College at New Paltz.
		Departure Time: 1:00 p.m. Travel will be by bus.
		Leave the parking lot by way of Mohonk Avenue.
00.1	00.1	Turn right (W) onto Mohonk Avenue.
00.2	00.2	Turn right (S) onto Route 32.
00.7	00.7	College Service Buildings.
01.1	01.1	Gravelly soil on the ridge flank to the left is thought to be evidence of the "State Prison" Moraine.
03.5	03.5	Note the abandoned stream gap to the left.
03.8	03.8	Cross the elbow of capture of a stream as it is diverted into a postglacial gorge on the right.
0.60	06.0	Center of the Village of Modena. Turn right (W) at the traffic light onto Routes 44-55.
06.1	06.1	Cross the crest of the second inner Wallkill Moraine.
07.1	07.1	Cross the crest of the State Prison Moraine.
07.4	07.4	Cross the Catskill Aqueduct.
07.5	07.5	Ireland Corners traffic light. Turn left (S) onto Route 208. The State Prison Moraine is recrossed here - it can be seen on the right as a subdued ridge that becomes more pronounced further south.
08.2	08.2	State Prison Moraine well displayed on right.
09.0	09.0	A striated bedrock knob is exposed to left.
09.9	09.9	Cross the Catskill Aqueduct.

TOTAL MILES	Miles from last stop	Remarks
11.6	11.6	Cross the crest of the second inner Wallkill Moraine. The moraine is on a bedrock escarpment and is not nearly as massive as it appears.
13.1	13.1	The Wallkill Moraine is well displayed on the left as the road bends right.
13.7	13.7	Continue straight through the village of Wallkill. Route 208 leaves to the left.
13.9	13.9	Turn left (W) at the Post Office, onto Hoagerburgh Road.
14.0	14.0	Cross the Wallkill River. This bedrock knickpoint is the beginning of the lower Wallkill Valley. From this point north there is a steep bedrock gorge indicating a youthful, north flowing, ancestral stream. To the south a gentle bedrock gradient indicates a fairly old southerly flowing ancestral stream tributary to the Delaware River system.
14.7	14.7	Turn right (N) onto the Albany Road.
16.5	16.5	Turn right (E) at Galeville.
16.6	16.6	Cross the Wallkill River.
17.1	17.1	STOP NO. 1. Examine the form and structure of the State Prison Moraine to see whether it is a moraine or a longitudinal ice-channel filling.
		Turn left (N) onto Sand Hill Road.
18.5	01.4	The State Prison Moraine leaves to the right.
21.0	03.9	Turn right (E) onto Routes 44-55 in the village of Gardiner.
22.0	04.9	Ireland Corners. Turn left (N) onto Route 208 at the traffic light.
22.9	05.8	The State Prison Moraine deposits on the right probably block the preglacial path of the Timekill.

TOTAL MILES	Miles from last stop	Remarks
25.1	08.0	The postglacial Timekill gorge is on the right.
25.4	08.3	On a clear day a splendid panorama can be viewed on the left. In the foreground is the lower Wallkill Valley with the Shawangunk Mountain cuesta in the distance. The Catskills can also be observed on the skyline, north of the Shawangunks.
25.9	08.8	Cross the Timekill where it has been diverted westward by its own deposits.
26.2	09.1	Turn left (W) onto Cedar Lane.
26.4	09.3	Railroad Crossing - bad bump!
26.5	09.4	Turn right (N) onto Plains Road and follow the Timekill (Plains Road) delta.
27.2	10.1	STOP NO. 2. Leave the bus and walk through the field on the left to the sand pit. Examine the cut-and-fill stratification and the absence of foreset and bottom set beds. This deposit is a remnant of a 230 foot delta deposited in the northern end of Lake Tillson.
		Continue north on Plains Road.
27.6	00.4	The Wallkill River is on the left.
27.7	00.5	Railroad crossing!
28.0	00.8	Follow Mohonk Avenue to the right.
28.2	01.0	Turn left (N) onto Route 208.
28.3	01.1	Center of the village of New Paltz. Continue straight at the STOP SIGN.
28.9	01.7	From this point to our next turn the road follows the 230 foot shoreline of Lake Tillson. This may explain the many (wave washed?) exposures on the east side of the road.
33.3	06.1	Turn right (E) onto Route 213.
33.5	06.3	Pass under the Thruway.
33.6	06.4	The Society of Brothers - home of <u>Community Playthings</u> - is on the right.
34.0	06.8	The Rifton gorge is on the left.

TOTAL MILES	Miles from last stop	Remarks
34.3	07.1	STOP NO. 3. This is a brief stop to discuss the diversion of the postglacial Wallkill from its preglacial valley to the west.
		Return west to Route 32.
35.3	01.0	Turn right (N) onto Route 32.
35.4	01.1	Cross the Wallkill River.
36.0	01.7	The Happy Hour Bar marks the toe of the Tillson delta. We will ascend the delta for the next ½ mile.
36.6	02.3	Center of the Village of Tillson.
36.9	02.6	Descend from the 240 foot delta surface to Rondout Creek at 65 feet.
37.8	03.5	Cross Rondout Creek.
37.9	03.6	Route 213 leaves to the left.
39.7	05.4	Cross over the Thruway.
39.8	05.5	Turn right (E) onto Albert Avenue.
39.9	05.6	STOP NO. 4. Leave the bus and walk down the pathway to the Maple Hill sand pit. Here we will examine the bottom set and foreset outwash (?) of the Rosendale Readvance and the till-like deposit that overlies the lacustrine sands.
		Return to Route 32.
40.0	00.1	Turn left (S) onto Route 32.
47.9	08.0	Center of the village of New Paltz. Turn left (W) onto Route 299 and continue through the village.
48.4	08.5	Turn right (N) onto Route 32 at the traffic light.
48.7	08.8	Turn right (W) onto Mohonk Avenue.
48.8	08.9	Turn left into the Coykendall Parking lot.
48.9	09.0	The end of the trip.